

RED SEAL

THE INTERPROVINCIAL STANDARDS RED SEAL PROGRAM



National Occupational Analysis

2009

Sprinkler System Installer



Human Resources and
Skills Development Canada

Ressources humaines et
Développement des compétences Canada

Canada

Sprinkler System Installer

2009

Trades and Apprenticeship Division

Workplace Partnerships Directorate

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FOREWORD

The Canadian Council of Directors of Apprenticeship (CCDA) recognizes this National Occupational Analysis as the national standard for the occupation of Sprinkler System Installer.

Background

The first National Conference on Apprenticeship in Trades and Industries, held in Ottawa in 1952, recommended that the federal government be requested to cooperate with provincial and territorial apprenticeship committees and officials in preparing analyses of a number of skilled occupations. To this end, Human Resources and Skills Development Canada sponsors a program, under the guidance of the CCDA, to develop a series of National Occupational Analyses (NOA).

The NOAs have the following objectives:

- to describe and group the tasks performed by skilled workers;
- to identify which tasks are performed in every province and territory;
- to develop instruments for use in the preparation of Interprovincial Red Seal Examinations and curricula for training leading to the certification of skilled workers;
- to facilitate the mobility of apprentices and skilled workers in Canada; and,
- to supply employers, employees, associations, industries, training institutions and governments with analyses of occupations.

ACKNOWLEDGEMENTS

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This analysis was prepared by the Workplace Partnerships Directorate of HRSDC. The coordinating, facilitating and processing of this analysis were undertaken by employees of the National Occupational Analysis (NOA) development team of the Trades and Apprenticeship Division. Brian Garry for the host jurisdiction of Ontario also participated in the development of this NOA.

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**LIST OF PUBLISHED
NATIONAL OCCUPATIONAL ANALYSES
(Red Seal Trades)**

Title	NOC* Code
Agricultural Equipment Technician (2007)	7312
Appliance Service Technician (2005)	7332
Automotive Painter (2005)	7322
Automotive Service Technician (2009)	7321
Baker (2006)	6252
Boilermaker (2008)	7262
Bricklayer (2007)	7281
Cabinetmaker (2007)	7272
Carpenter (2005)	7271
Concrete Finisher (2006)	7282
Construction Craft Worker (2009)	7611
Construction Electrician (2008)	7241
Cook (2008)	6242
Electrical Rewind Mechanic (1999)	7333
Electronics Technician – Consumer Products (1997)	2242
Floorcovering Installer (2005)	7295
Glazier (2008)	7292
Hairstylist (2009)	6271
Heavy Duty Equipment Technician (2004)	7312
Industrial Electrician (2008)	7242
Industrial Mechanic (Millwright) (2007)	7311
Instrumentation and Control Technician (2007)	2243
Insulator (Heat and Frost) (2007)	7293
Ironworker (Generalist) (2006)	7264
Ironworker (Reinforcing) (2006)	7264
Ironworker (Structural/Ornamental) (2006)	7264
Lather (Interior Systems Mechanic) (2007)	7284
Machinist (2005)	7231

*National Occupational Classification

Title	NOC* Code
Metal Fabricator (Fitter) (2008)	7263
Mobile Crane Operator (2009)	7371
Motorcycle Mechanic (2006)	7334
Motor Vehicle Body Repairer (Metal and Paint) (2005)	7322
Oil Heat Systems Technician (2006)	7331
Painter and Decorator (2007)	7294
Partsperson (2005)	1472
Plumber (2008)	7251
Powerline Technician (2009)	7244
Recreation Vehicle Service Technician (2006)	7383
Refrigeration and Air Conditioning Mechanic (2009)	7313
Rig Technician (2008)	8232
Roofer (2006)	7291
Sheet Metal Worker (2006)	7261
Sprinkler System Installer (2009)	7252
Steamfitter — Pipefitter (2008)	7252
Tilesetter (2004)	7283
Tool and Die Maker (2005)	7232
Transport Trailer Technician (2008)	7321
Truck and Transport Mechanic (2007)	7321
Welder (2009)	7265

Requests for these National Occupational Analyses may be forwarded to:

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 Workplace Partnership Directorate
 Human Resources and Skills Development Canada
 140 Promenade du Portage, Phase IV, 5th Floor
 Gatineau, Quebec K1A 0J9

**These publications are also available to order or download online at: www.red-seal.ca.
 Links to Essential Skills Profiles for some of these trades are also available on this website.**

STRUCTURE OF ANALYSIS

To facilitate understanding of the occupation, the work performed is divided into the following categories:

Blocks	the largest division within the analysis that is comprised of a distinct set of trade activities
Tasks	distinct actions that describe the activities within a block
Sub-Tasks	distinct actions that describe the activities within a task
Key Competencies	activities that a person should be able to do in order to be called competent in the trade

The analysis also provides the following information:

Trends	changes identified that impact or will impact the trade including work practices, technological advances, and new materials and equipment
Related Components	a list of products, items, materials and other elements relevant to the block
Tools and Equipment	categories of tools and equipment used to perform all tasks in the block; these tools and equipment are listed in Appendix A
Context	information to clarify the intent and meaning of tasks
Required Knowledge	the elements of knowledge that an individual must acquire to adequately perform a task

The appendices located at the end of the analysis are described as follows:

Appendix A — Tools and Equipment	a non-exhaustive list of tools and equipment used in this trade
Appendix B — Glossary	definitions or explanations of selected technical terms used in the analysis
Appendix C — Acronyms	a list of acronyms used in this analysis with their full name
Appendix D — Block and Task Weighting	the block and task percentages submitted by each jurisdiction, and the national averages of these percentages; these national averages determine the number of questions for each block and task in the Interprovincial exam
Appendix E — Pie Chart	a graph which depicts the national percentages of exam questions assigned to blocks
Appendix F — Task Profile Chart	a chart which outlines graphically the blocks, tasks and sub-tasks of this analysis

DEVELOPMENT AND VALIDATION OF ANALYSIS

Development of Analysis

A draft analysis is developed by a committee of industry experts in the field led by a team of facilitators from Human Resources and Skills Development Canada. This draft analysis breaks down all the tasks performed in the occupation and describes the knowledge and abilities required for a tradesperson to demonstrate competence in the trade.

Draft Review

The National Occupational Analysis (NOA) development team then forwards a copy of the analysis and its translation to provincial and territorial authorities for a review of its content and structure. Their recommendations are assessed and incorporated into the analysis.

Validation and Weighting

The analysis is sent to all provinces and territories for validation and weighting. Participating jurisdictions consult with industry to validate and weight the document, examining the blocks, tasks and sub-tasks of the analysis as follows:

- | | |
|------------------|--|
| BLOCKS | Each jurisdiction assigns a percentage of questions to each block for an examination that would cover the entire trade. |
| TASKS | Each jurisdiction assigns a percentage of exam questions to each task within a block. |
| SUB-TASKS | Each jurisdiction indicates, with a YES or NO, whether or not each sub-task is performed by skilled workers within the occupation in its jurisdiction. |

The results of this exercise are submitted to the NOA development team who then analyzes the data and incorporates it into the document. The NOA provides the individual jurisdictional validation results as well as the national averages of all responses. The national averages for block and task weighting guide the Interprovincial Red Seal Examination plan for the trade.

This method for the validation of the NOA also identifies common core sub-tasks across Canada for the occupation. If at least 70% of the responding jurisdictions perform a sub-task, it shall be considered common core. Interprovincial Red Seal Examinations are based on the common core sub-tasks identified through this validation process.

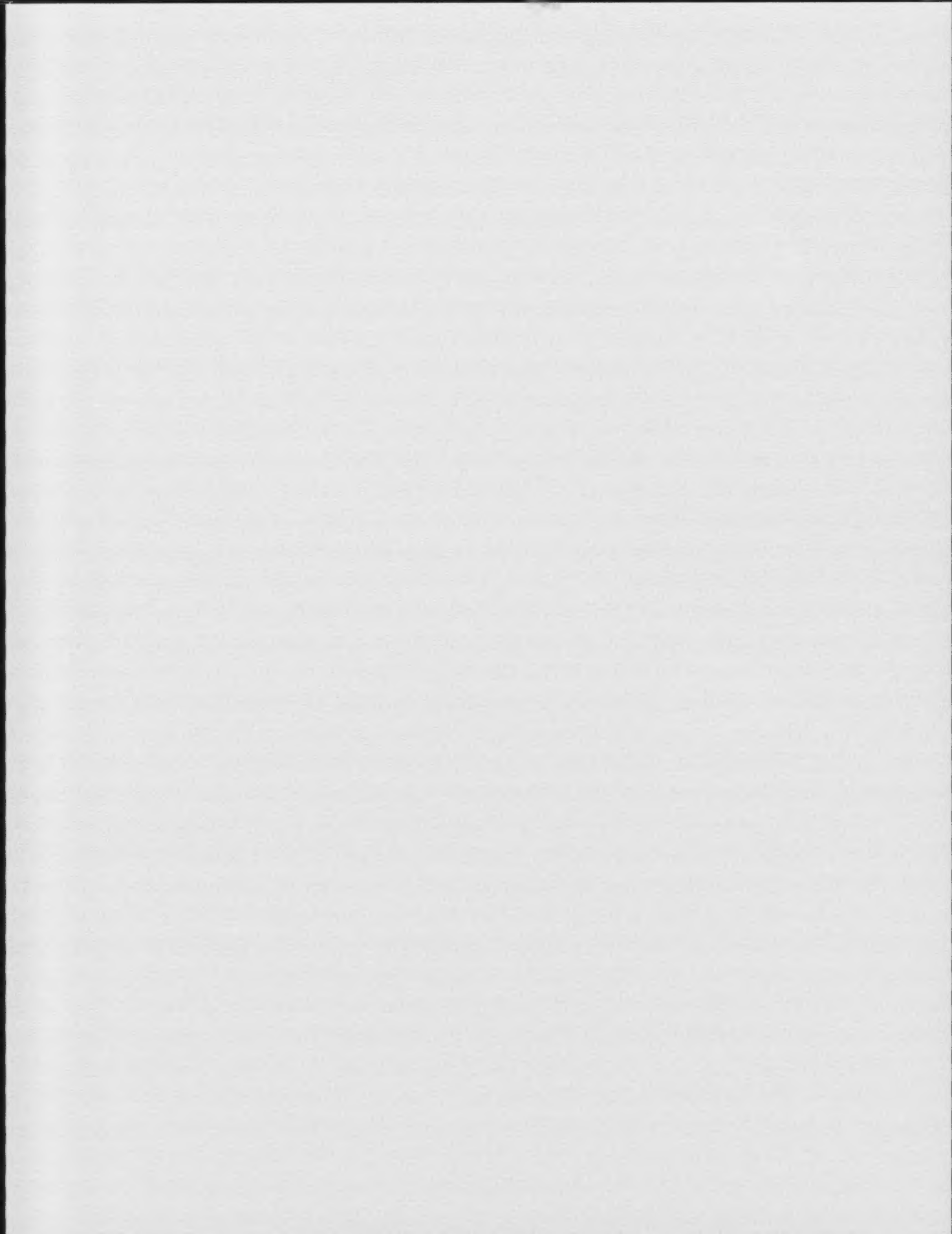
Definitions for Validation and Weighting

YES	sub-task performed by qualified workers in the occupation in a specific jurisdiction
NO	sub-task not performed by qualified workers in the occupation in a specific jurisdiction
NV	analysis <u>N</u> ot <u>V</u> alidated by a province/territory
ND	trade <u>N</u> ot <u>D</u> esignated in a province/territory
NOT COMMON CORE (NCC)	sub-task, task or block performed by less than 70% of responding jurisdictions; these will not be tested by the Interprovincial Red Seal Examination for the trade
NATIONAL AVERAGE %	average percentage of questions assigned to each block and task in Interprovincial Red Seal Examination for the trade

Provincial/Territorial Abbreviations

NL	Newfoundland and Labrador
NS	Nova Scotia
PE	Prince Edward Island
NB	New Brunswick
QC	Quebec
ON	Ontario
MB	Manitoba
SK	Saskatchewan
AB	Alberta
BC	British Columbia
NT	Northwest Territories
YT	Yukon Territory
NU	Nunavut

ANALYSIS



Safe working procedures and conditions, accident prevention, and the preservation of health are of primary importance to industry in Canada. These responsibilities are shared and require the joint efforts of government, employers and employees. It is imperative that all parties become aware of circumstances that may lead to injury or harm. Safe learning experiences and work environments can be created by controlling the variables and behaviours that may contribute to accidents or injury.

It is generally recognized that safety-conscious attitudes and work practices contribute to a healthy, safe and accident-free work environment.

It is imperative to apply and be familiar with the Occupational Health and Safety Acts and Workplace Hazardous Materials Information System (WHMIS) Regulations. As well, it is essential to determine workplace hazards and take measures to protect oneself, co-workers, the public and the environment.

Safety education is an integral part of training in all jurisdictions. As safety is an imperative part of all trades, it is assumed and therefore it is not included as a qualifier of any activities. However, the technical safety tasks and sub-tasks specific to the trade are included in this analysis.

SCOPE OF THE SPRINKLER SYSTEM INSTALLER TRADE

"Sprinkler System Installer" is this trade's official Red Seal occupational title approved by the Canadian Council of Directors of Apprenticeship (CCDA). This analysis covers tasks performed by sprinkler system installers whose occupational title has been identified by some provinces and territories of Canada under the following names:

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
Pipefitter - Fire Protection Mechanic Specialty (Construction)					✓								
Sprinkler and Fire Protection Installer						✓							
Sprinkler System Installer	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓

Sprinkler system installers lay out, install, repair, maintain, modify and test fire protection systems in a variety of buildings and settings. They work on fire protection systems such as wet, dry, pre-action, stand pipe, clean agent, carbon dioxide and dry chemical. Their duties include: reading and interpreting engineered drawings, installing hangers and clamps to support the piping system, preparing the pipe, joining pipe using a variety of methods, installing associated equipment as well as maintaining, inspecting and testing all types of fire protection systems.

Sprinkler system installers usually, but not exclusively, work on industrial, institutional, commercial and residential sites such as office buildings, plants, factories, hospitals, hotels, houses, apartment buildings, airports and personal care homes. They may work for trade contractors, maintenance departments of factories, and gas utility and servicing companies. They may also be self-employed. Some sprinkler system installers specialize in installation, testing or inspection.

Sprinkler system installers use tools and equipment such as hand tools, portable and stationary power tools, measuring and testing equipment, access equipment, and rigging, hoisting and lifting equipment.

Sprinkler system installers work primarily indoors, often in unheated or temporarily-heated spaces. They may also be required to install outdoor systems both above and below ground. The installation of sprinkler equipment takes place throughout all phases of construction; typically in the mid- to latter stages of new construction or in situations where renovation of existing structures is undertaken or upgrading is legislated. Installers frequently work on the same site more than once and routinely perform a variety of tasks covering all aspects of the trade. They frequently are required to work in confined spaces and at heights. They must

tolerate physical discomfort due to extensive lifting of various weights overhead, temperature changes, noise and dust.

Key attributes for persons entering this trade are: mechanical and mathematical aptitude, manual dexterity, good communication and problem solving skills and the ability to pay close attention to detail. Physical strength and stamina, and the ability to work at a considerable height are also assets in this trade.

This analysis recognizes similarities or overlaps with the work of plumbers, steamfitter-pipefitters, carpenters and electricians.

Experienced sprinkler system installers may advance to positions such as foreman, estimators, contractors, inspection personnel and instructors. They also act as mentors and trainers of apprentices in the trade.

OCCUPATIONAL OBSERVATIONS

There is a growing demand for residential sprinkler systems due to new legislation and insurance requirements. This is creating a new area of work outside the typical Industrial, Commercial and Institutional (ICI) sectors. This work is covered by codes such as NFPA13R and NFPA13D

There is an increase in the installation of private water supply systems such as reservoirs and tanks. This is to meet the demand for fire protection systems in rural areas or other non-serviced areas, or where municipal water supply is inadequate.

Increasing concerns regarding the protection of life and property has resulted in new, more stringent legislation regarding installation, maintenance and testing of fire protection systems. These new requirements increase retrofit requirements of existing buildings.

The advances in technology require sprinkler system installers to upgrade their skills to adapt to the increased complexity of fire protection systems.

Safety has become more important in the work place. Compliance with safety regulations and practices is mandatory, and non-compliance is met with severe penalties for workers, employers and contractors.

There are smaller crews on worksites due to factors such as lighter material, and better tools and access equipment. However, the crews must be more versatile in their skill set to comply with job requirements.

Due to the increased demand of the service sector, sprinkler system installers are in greater contact with customers; therefore, communication skills are becoming more important.

BLOCK A

COMMON OCCUPATIONAL SKILLS

Trends	Use of tools such as laser levels and cordless tools is increasing in the trade. There is an increase in use of lighter tools such as aluminium wrenches, ladders and portable groovers. Due to the complexity of the trade and more frequent testing, there is an increase in the variety of diagnostic equipment.
Related Components	All components apply.
Tools and Equipment	See Appendix A.

Task 1

Uses and maintains tools and equipment.

Context	Sprinkler system installers use and maintain tools and equipment to allow them to perform the tasks of their trade safely and efficiently.
----------------	--

Required Knowledge

K 1	types of hand tools such as pipe wrenches, measuring devices, levels and head wrenches
K 2	types of portable power tools such as drills, reciprocating saws and chop saws
K 3	types of brazing tools
K 4	government legislation and regulations related to the use of access equipment, and rigging, hoisting and lifting equipment
K 5	government legislation and regulations such as transportation of dangerous goods (TDG) and WHMIS related to the handling of materials such as cutting oil, paint and antifreeze
K 6	types of measuring and testing equipment such as multimeters, refractometers and Pitot tubes
K 7	mathematical skills related to the use of measuring and testing equipment
K 8	access equipment such as elevated work platforms, ladders and scaffolding

K 9	certification and training requirements for access equipment, personal protective equipment (PPE) and safety equipment
K 10	types, operating procedures and capacities of rigging, hoisting and lifting equipment
K 11	PPE such as hard hats, safety glasses and respirators
K 12	safety equipment such as first aid kits and fire extinguishers
K 13	fall arrest equipment and requirements
K 14	stationary tools such as power vices, drill presses, and hydraulic groovers and cutters

Sub-task

A-1.01 Maintains hand tools.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

A-1.01.01	inspect hand tools for damage such as dull blades, worn jaws on pipe wrenches, and chipped cutting wheels
A-1.01.02	lubricate hand tools such as flaring tools and cutters to ensure proper operation
A-1.01.03	wipe tools after use to ensure they are clean and corrosion-free
A-1.01.04	store hand tools in a clean, dry and secure location to ensure they are in operating condition
A-1.01.05	replace hand tool parts such as cutting blades and cutting wheels

Sub-task

A-1.02 Maintains portable and stationary power tools.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

A-1.02.01	check batteries and chargers to ensure they are in good condition and batteries are fully charged
A-1.02.02	inspect power tools for unsafe conditions such as missing parts, defective or missing guards and frayed cords

A-1.02.03	inspect power tool parts such as cutting blades, bits and dies to identify defects, faults and worn parts
A-1.02.04	clean power tools to ensure they are ready for use
A-1.02.05	check function of ground fault interrupter (GFCI) devices
A-1.02.06	lubricate tools such as hammer drills, power vices and groovers as part of preventive maintenance
A-1.02.07	store power tools in a clean, dry and secure location to ensure they are in operating condition

Sub-task

A-1.03 Maintains measuring and testing equipment.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

A-1.03.01	inspect leads, probes and sensors for damage and wear
A-1.03.02	verify that calibration of equipment such as test gauges, cross connection testing kits, refractometers and tachometers has been performed and is current
A-1.03.03	drain equipment such as test pumps and cross connection testing kits to prevent damage from freezing
A-1.03.04	clean equipment after use to prevent false readings and damage
A-1.03.05	store measuring and testing equipment to prevent damage

Sub-task

A-1.04 Uses access equipment.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

A-1.04.01	select ladders and work platforms for the job taking into consideration factors such as height, site conditions and task being performed
A-1.04.02	inspect ladders and scaffolding before use for damage and missing components
A-1.04.03	secure access equipment such as ladders and scaffolding

A-1.04.04	erect, level and dismantle scaffolding according to jurisdictional regulations
A-1.04.05	use equipment within operating limitations as indicated on manufacturers' tags and in compliance with governmental regulations such as OH&S
A-1.04.06	perform safety inspection of elevated work platforms prior to use
A-1.04.07	operate elevated work platforms
A-1.04.08	recognize worn, damaged or defective access equipment and remove from service

Sub-task

A-1.05 **Uses rigging, hoisting and lifting equipment.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

A-1.05.01	select equipment for task considering factors such as weight, loads and distance to be travelled
A-1.05.02	inspect equipment such as slings, come-alongs and shackles for wear, damage and defects on a regular basis
A-1.05.03	remove defective equipment from service by methods such as destroying equipment and tagging equipment for repair
A-1.05.04	identify hazards such as power lines, excavations and excessive loads
A-1.05.05	rig loads following rigging procedures to ensure safety and to prevent damage to rigging equipment and material
A-1.05.06	attach and use tag lines to guide and position loads
A-1.05.07	use basic hand signals and two-way radios to communicate with equipment operators
A-1.05.08	store equipment in clean, dry and secure locations away from sunlight

Sub-task**A-1.06 Uses personal protective equipment (PPE) and safety equipment.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

- | | |
|-----------|--|
| A-1.06.01 | select, adjust and wear PPE for task and as identified by site policies and jurisdictional regulations |
| A-1.06.02 | identify outdated or damaged PPE such as hard hats, excessively worn boots and cracked safety glasses |
| A-1.06.03 | locate and use safety equipment such as fire extinguishers, eye wash stations and first aid kits |
| A-1.06.04 | replace safety harnesses and lanyards as required by regulations |
| A-1.06.05 | store PPE and safety equipment according to manufacturers' recommendations |

Task 2**Organizes work.**

Context	Sprinkler system installers organize their work in order to complete their tasks safely, efficiently and productively.
----------------	--

Required Knowledge

- | | |
|-----|--|
| K 1 | types of standards and codes such as NFPA standards, authority having jurisdiction (AHJ) requirements and both local and national building codes |
| K 2 | jurisdictional codes and regulations such as national, provincial and municipal |
| K 3 | types and formats of drawings and schematics |
| K 4 | information contained on schematics and drawings such as symbols, dimensions and tolerances |
| K 5 | trade practices and standard training procedures |
| K 6 | work-related documents such as repair orders, preventative maintenance sheets and service logs |
| K 7 | training and certification requirements such as TDG, WHMIS, first aid and fall arrest |
| K 8 | equipment and system specifications |

K 9	documents such as materials lists, work orders and permits
K 10	location of safety equipment and materials
K 11	WHMIS information such as labels and Material Safety Data Sheets (MSDS)
K 12	company safety policies and guidelines
K 13	metric and imperial measurements
K 14	trade terminology
K 15	contract documents such as drawings, addendums and specifications
K 16	methods of communication such as written, oral and electronic
K 17	company procedures such as service reports, and safety and communication procedures
K 18	scale such as engineers' and architectural

Sub-task

A-2.01 **Interprets codes, regulations and procedures.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

A-2.01.01	locate code sections that apply to the task being performed
A-2.01.02	use code information to perform required calculations
A-2.01.03	refer to and interpret tables and charts in codes
A-2.01.04	refer to jurisdictional regulations
A-2.01.05	refer to facility and equipment procedures for tasks such as lock-out and shutdown
A-2.01.06	refer to manufacturers' or owners' start-up procedures to ensure equipment is commissioned correctly
A-2.01.07	adhere to company procedures such as service reports, and safety and communication procedures

Sub-task**A-2.02 Interprets blueprints and specifications.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

A-2.02.01	refer to manufacturers' and shop drawings to obtain equipment specifications such as weight, size and service access locations
A-2.02.02	refer to engineering specifications to determine which equipment is required
A-2.02.03	refer to drawings to identify possible obstructions and locations of components of fire protection systems such as branch lines, heads and mains
A-2.02.04	scale drawings for placement of equipment and accessories, coring of holes and location of utilities
A-2.02.05	interpret drawings such as isometric, elevation and plan views
A-2.02.06	interpret schematic drawings and pictorial diagrams to obtain information on electrical equipment

Sub-task**A-2.03 Uses documentation and reference material.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

A-2.03.01	refer to technical bulletins and manuals to obtain detailed information about equipment
A-2.03.02	submit as-built drawings that indicate modifications to original plans
A-2.03.03	maintain documents such as work orders and equipment safety logs
A-2.03.04	complete written documents such as service requests, work orders, incident reports, hot work permits and time sheets
A-2.03.05	complete and submit reports such as inspection, material and test sheets and verification reports to keep accurate records for future reference

Sub-task**A-2.04 Communicates with others.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

A-2.04.01	communicate with non-tradespeople such as consultants, engineers, owners and end-users to relay technical information
A-2.04.02	communicate with other tradespeople such as crane operators, drywallers, plumbers, electricians and sheet metal workers
A-2.04.03	coordinate layout and installation of fire protection systems to avoid interference with other trades
A-2.04.04	communicate with and mentor apprentices
A-2.04.05	communicate with office staff such as dispatchers, sales staff and managers

Sub-task**A-2.05 Plans daily job tasks and procedures.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

A-2.05.01	prepare a material list to confirm availability and order materials required for task
A-2.05.02	schedule delivery of equipment and materials
A-2.05.03	arrange for storage of materials in a safe and secure location until required for task
A-2.05.04	arrange time to access work site to avoid down time and delays
A-2.05.05	schedule tasks with other trades such as sheet metal workers, electricians and plumbers
A-2.05.06	assign qualified personnel to specific locations and tasks to ensure task is completed efficiently and deadlines are met
A-2.05.07	arrange for use of major tools and equipment such as cranes, hydraulic groovers and elevated work platforms

- A-2.05.08 organize tools and equipment usage to make sure the right tools and equipment are available when needed
- A-2.05.09 estimate labour needs for completion of tasks taking into consideration factors such as deadlines, expertise and movement of material and equipment

Sub-task

A-2.06 Maintains safe work environment.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

- A-2.06.01 follow specified safety procedures such as fall arrest, hot work and confined space procedures
- A-2.06.02 recognize hazards such as high voltage, rotating equipment, working at heights and around hazardous materials
- A-2.06.03 maintain a clean and tidy work site to avoid injuries to self and others
- A-2.06.04 comply with site-specific and company lock-out and tag-out procedures when working on equipment to avoid injury
- A-2.06.05 coordinate tasks with other workers to avoid injury to self and others
- A-2.06.06 place flagging, pylons and signage when working in high traffic areas
- A-2.06.07 handle hazardous materials in accordance with WHMIS procedures such as disposal, labelling and use of PPE
- A-2.06.08 participate in safety meetings and discussions to ensure that information is recorded and distributed to all team members
- A-2.06.09 recognize and report unsafe conditions so that they may be rectified

Task 3**Performs common trade activities.**

Context These activities are performed in all aspects of sprinkler system installation, maintenance and repair, and are needed to ensure all projects are completed in an efficient manner.

Required Knowledge

- K 1 types of fasteners such as anchors, bolts and inserts
- K 2 types and applications of supports and hangers such as riser clamps, concrete inserts, beam clamps and rings
- K 3 limitations of fasteners, supports and hangers
- K 4 specialty supports and hangers such as seismic bracing and vibration isolation
- K 5 compatibility of fasteners, supports and hangers with other materials
- K 6 types of compressed gases such as acetylene, nitrogen and carbon dioxide
- K 7 types of cutting oil
- K 8 types of sealants and lubricants such as silicone, spray foam and pipe dope
- K 9 application techniques for sealants
- K 10 environmental protection requirements for substances such as sprinkler water, cutting oil, antifreeze and fire-extinguishing gas
- K 11 characteristics and applications of cleaners and lubricants
- K 12 building structures
- K 13 system requirements of the NFPA and AHJ
- K 14 storage and installation procedures for various piping systems
- K 15 basic trigonometry

Sub-task**A-3.01 Prepares work site.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

A-3.01.01	inspect work site to identify hazards in the work area
A-3.01.02	erect barricades and flagging to warn others
A-3.01.03	set up fabrication tools and equipment in close proximity to work being performed taking into consideration other trades
A-3.01.04	identify area for secure storage of tools, equipment and supplies
A-3.01.05	locate washrooms, safety equipment and emergency exits on site
A-3.01.06	identify on-site hazards such as overhead lines, fall hazards and quality of air
A-3.01.07	locate service points such as water and electricity
A-3.01.08	locate isolation points such as water and electrical shut-offs
A-3.01.09	coordinate site access for equipment such as cranes, elevated work platforms and delivery trucks

Sub-task**A-3.02 Handles materials and supplies.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

A-3.02.01	receive and verify delivered material using packing slips, serial numbers and model numbers
A-3.02.02	inspect delivered materials to detect shipping damage
A-3.02.03	check or apply labels on materials and supplies such as cutting oils, fuel containers, fire extinguishers and antifreeze according to procedures such as WHIMS regulations and company policies
A-3.02.04	secure material and supplies when being stored or shipped by using equipment such as chains, straps and slings
A-3.02.05	select and use equipment such as forklifts, power jacks and hand carts
A-3.02.06	store materials and supplies such as sprinkler heads and solvent cement at appropriate temperature to prevent deterioration or damage

A-3.02.07	follow storage procedures to ensure integrity of materials
A-3.02.08	manually lift materials and supplies according to industry standards to avoid personal injury and damage to materials and equipment

Sub-task

A-3.03 Installs supports and hangers.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

A-3.03.01	select supports and hangers such as beam clamps, coach screw (CS) rods and riser clamps according to factors such as size, spacing, and application
A-3.03.02	select and use tools and equipment such as hammer drills, adjustable wrenches and hacksaws
A-3.03.03	calculate size of trapeze hangers according to span and load bearing requirements
A-3.03.04	select attachment points for supports and hangers according to spacing of sprinkler pipe and components
A-3.03.05	fasten supports and hangers to attachment points on building construction material such as wood, concrete and steel
A-3.03.06	fasten clamps to supporting structure
A-3.03.07	check placement of all hangers, brackets, supports and restraints by inspecting and referring to specifications

Sub-task

A-3.04 Performs layout of systems.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

A-3.04.01	determine number, type and location of heads according to factors such as occupancy hazard, ceiling structure and type of system
A-3.04.02	snap lines for hanger locations to ensure sprinkler lines are installed consistently in a straight line

A-3.04.03	measure from structure to locate main and branch lines within allowable distances
A-3.04.04	use level to aid in the installation of supports and hangers and to ensure slope and straightness of lines
A-3.04.05	use tools such as plumb bobs and laser levels to locate sleeves and coring holes
A-3.04.06	transfer information on reflected ceiling plan to final installation
A-3.04.07	modify layout to accommodate site conditions such as ducts, structural members and lighting

Task 4

Commissions systems.

Context Commissioning is the final step in installing fire protection systems. It involves verification and testing of the systems and their components to ensure they operate within design parameters, and meet all applicable codes and specifications.

Required Knowledge

K 1	components of water supply systems
K 2	commissioning requirements of water supply systems
K 3	commissioning requirements for piping installations
K 4	commissioning of detection, protection and control systems
K 5	restraints and seismic requirements
K 6	codes and standards
K 7	manufacturer's specifications

Sub-task**A-4.01 Commissions water supply systems.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

A-4.01.01	verify that hydrostatic, chlorination and flushing tests have been completed on underground piping prior to connection of internal components
A-4.01.02	conduct acceptance test of fire pump system to verify operation of pump assembly
A-4.01.03	verify that components of water supply systems such as cross connection control assemblies, water tanks and reservoirs are operating according to manufacturer's specifications
A-4.01.04	confirm with AHJ that water supply systems and their components are in compliance with codes and specifications
A-4.01.05	ensure that all documentation has been completed

Sub-task**A-4.02 Commissions piping installation.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

A-4.02.01	perform hydrostatic and pneumatic tests on piping and components of piping installation
A-4.02.02	verify seal of pipe penetrations through floors, walls and ceilings to ensure fire rating, weather-proofing and compatibility
A-4.02.03	check placement of all hangers, brackets, supports and restraints by inspecting and referring to specifications
A-4.02.04	check grade and elevation of piping installation according to code or site-specific requirements
A-4.02.05	ensure that piping and components are protected against environmental conditions (interior and exterior)
A-4.02.06	verify that pipe preparation such as flushing and swabbing have been done to ensure that foreign material such as cut-out discs, oil and welding slag has been removed

A-4.02.07	ensure pipe has been labelled according to site specifications
A-4.02.08	ensure that all documentation such as commissioning reports and as-built drawings have been completed and submitted

Sub-task

A-4.03 Commissions detection, protection and control systems.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

A-4.03.01	perform hydrostatic and pneumatic tests on system components
A-4.03.02	verify operation of control valves such as post indicator valves (PIVs), butterfly and OS&Y valves through their full range
A-4.03.03	verify components such as alarm valves, compressors and accelerators to confirm their performance meets their design criteria
A-4.03.04	ensure that devices are protected against environmental conditions (interior and exterior)
A-4.03.05	ensure components have been tagged and labelled according to site specifications
A-4.03.06	verify that all escutcheons and guards are in place and sprinkler bulb protectors are removed
A-4.03.07	verify operation of detection devices such as heat-actuated detectors (HADs), smoke sampling devices and linear heat detectors according to site specifications
A-4.03.08	verify positioning of protection devices such as sprinkler heads and HADs to ensure proper coverage is achieved
A-4.03.09	ensure that components have been installed according to installation requirements
A-4.03.10	ensure that all documentation such as commissioning reports and as-built drawings have been completed and submitted
A-4.03.11	verify operation of signal initiating devices such as flow, pressure and tamper switches within accepted parameters

BLOCK B**WATER SUPPLY INSTALLATION**

Trends	Municipal water systems cannot always meet the needs of fire protection systems. As such, supplemental water supply may be necessary, and there may be increased requirements for the installation of private water supply and fire pumps.
Related Components (including, but not limited to)	Pipes (ductile iron, CPVC, copper, steel, brass, stainless steel), flanges, relief valves, hydrants, check valves, control valves, test headers, flow meter, pipe fittings, jockey pumps, diesel pumps, electric pumps, cross connection control assemblies.
Tools and Equipment	Hand tools, portable power tools, measuring and testing equipment, access equipment, rigging, hoisting and lifting equipment, PPE and safety equipment.

Task 5**Installs underground water supplies.**

Context	Sprinkler system installers connect underground piping and components from a predetermined water source to provide a reliable and adequate water supply to fire protection systems.
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Required Knowledge

K 1	trenching requirements such as location, depth, workable space and slope
K 2	permit requirements
K 3	code requirements
K 4	soil conditions and their impact on installation
K 5	piping and component protection methods
K 6	testing methods such as chlorination tests
K 7	flushing techniques
K 8	seismic requirements
K 9	water flow requirements for flushing
K 10	valve chamber requirements

Sub-task**B-5.01 Supervises trenching and backfilling.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	no	no	no	yes	NV	NV	NV

Key Competencies

B-5.01.01	lay out location for trench to ensure accessibility for machinery, material and manpower
B-5.01.02	verify location of underground and overhead services such as gas, power and telephone to prevent injury and disruption of service
B-5.01.03	coordinate tie-ins with AHJ to avoid or minimize disruptions to water supply
B-5.01.04	inspect trench for adequate size and depth to allow for pipe installation
B-5.01.05	coordinate laydowns for debris, backfill and installation material and tools
B-5.01.06	select backfill material according to piping requirements and local requirements
B-5.01.07	ensure safe access to trench for installation of underground materials
B-5.01.08	verify backfill compaction according to site requirements and specifications

Sub-task**B-5.02 Installs underground piping and components.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	no	no	no	yes	NV	NV	NV

Key Competencies

B-5.02.01	identify type and class of piping material and fittings according to AHJ, plans and specifications, and local requirements
B-5.02.02	select and use tools and equipment such as cut-off saws, portable grinders, torque wrenches and pry bars
B-5.02.03	assemble pipe and fittings using joining methods such as bell and spigot, flange with gasket, and mechanical according to specifications
B-5.02.04	restrain pipe and fittings with anchoring systems such as thrust blocks, rodding, anchors and clamps to provide stability, prevent a blow-out and protect against damage
B-5.02.05	apply adequate protective material below and above pipe to prevent damage from foreign objects such as rocks and roots

B-5.02.06	attach components such as gate valves, PIVs and fire hydrants to piping to allow proper control and isolation of fire water system
B-5.02.07	connect piping to water source with devices such as tapping valves and underground tees to ensure adequate water supply to fire protection system
B-5.02.08	lay tracer wire and identification ribbon with pipe according to jurisdictional requirements to allow for future location and identification of pipe
B-5.02.09	ensure cathodic protection meets specifications
B-5.02.10	allow for clearances and tolerances between piping and surrounding environment such as under railroad tracks and through concrete structures to prevent damage caused by excessive stress loads
B-5.02.11	seal pipe penetrations through structures such as walls, foundations and floors to maintain impermeability of structure using material such as hydraulic cement and caulking
B-5.02.12	test underground piping and components for leaks using a hydrostatic test
B-5.02.13	terminate and cap pipe in selected location inside building, ensuring its accessibility
B-5.02.14	install testing connection water termination point and fire hydrants to allow for flushing, testing and chlorination

Sub-task

B-5.03 Flushes underground system.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	no	yes	NV	NV	NV

Key Competencies

B-5.03.01	select and install flanges, fittings and valves on the underground connection inside the building to allow for required flow
B-5.03.02	select and use tools and equipment such as pitot tube, fire hoses and fire hydrant wrenches
B-5.03.03	ensure underground control valve is open at water source to pressurize system
B-5.03.04	connect hoses to flushing connections at determined points and direct water to safe location
B-5.03.05	discharge water flow from flushing connections allowing predetermined flow requirements

Task 6**Installs fire and booster pumps.**

Context Fire and booster pumps are an integral part of fire protection system. They provide pressure and flow to the fire protection system. They can be used with stand-alone or secondary water supplies, or as a booster to municipal water supply.

Required Knowledge

K 1	types of pumps such as centrifugal and positive displacement pumps
K 2	diesel and electric drivers
K 3	controllers
K 4	pump components such as check valves, relief valves, by-pass connections and fittings
K 5	ventilation and exhaust requirements for fuel fed pumps
K 6	fuel system requirements

Sub-task

B-6.01 Determines location of pumps, drivers, controllers and components.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

B-6.01.01	select and use tools and equipment such as measuring devices, lights, chalk lines and laser levels
B-6.01.02	inspect room layout prior to installation to confirm adequate space and prevent interference of pumps and components with other building services
B-6.01.03	verify layout with drawings to ensure compliance with specifications
B-6.01.04	layout pumps and components in pump room to ensure accessibility for service
B-6.01.05	determine pump by-pass requirements to allow public water supply to provide system demand

Sub-task**B-6.02 Installs pumps, controllers and components.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

B-6.02.01	select and use tools and equipment such as levels, drills and chain fall
B-6.02.02	place pumps in predetermined locations on a base or pad as specified
B-6.02.03	calculate elevation to install pumps to suit water supply piping
B-6.02.04	adjust pump elevation to set and secure pump in place using materials such as shims, mounts and grout
B-6.02.05	mount controllers and power transfer switches in desired location within the pump room and visible from the pump
B-6.02.06	connect pipe and components such as sensing lines, test headers, by-pass connections and relief valves to fire pump, jockey pump and controllers
B-6.02.07	connect driver to pump with components such as right-angle gear drives, universals joints and flexible couplings to provide power to pump
B-6.02.08	set fuel tanks and piping at proper elevation to allow adequate fuel supply to diesel driver according to AHJ and specifications
B-6.02.09	install fuel lines from tank to engine
B-6.02.10	install exhaust system to evacuate exhaust from the pump room to exterior
B-6.02.11	install strainers to protect pump from debris from raw water supplies
B-6.02.12	install all required fire pump components according to NFPA standards

Task 7**Installs private water supply systems.**

Context Private water supply systems are normally the only water supply for the fire protection system in remote areas. They can also be used as a secondary supply in areas where municipal supply is insufficient.

Required Knowledge

K 1	types of tanks such as gravity, pressure, below-grade and residential water supply
K 2	uses and application of tanks and reservoirs
K 3	pipng requirements on tanks and reservoirs
K 4	components of private water supply systems

Sub-task**B-7.01 Installs water tanks.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

B-7.01.01	determine location of water tank according to pump location, accessibility and load bearing requirements
B-7.01.02	install base, mounts and anchors to level and stabilize tank
B-7.01.03	place tank in predetermined location according to specifications
B-7.01.04	select and use tools and equipment such as lifting equipment, levels and measuring tapes
B-7.01.05	fill tank with water to verify its integrity
B-7.01.06	install cathodic protection as required to prevent electrolysis

Sub-task**B-7.02 Installs related equipment.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

B-7.02.01	install controlling devices such as pressure switches, agitators and control valves on tank and in reservoirs
B-7.02.02	select and use tools and equipment such as wrenches, drills, levels and measuring tapes
B-7.02.03	install fill line to tank to allow for periodic filling of water supply tank
B-7.02.04	connect test connection from fire pump to tank to conserve water during testing procedures
B-7.02.05	install indicating devices on tank to maintain water level and temperature
B-7.02.06	install supervisory devices on tank to discharge excess water to drain
B-7.02.07	install debris screen in reservoir prior to installing pump
B-7.02.08	install anti-vortex device to prevent aeration of pump water supply

BLOCK C

PIPING INSTALLATION

Trends

Piping and supports are being fabricated with lighter and thinner materials. Joining methods are less physically demanding, making the piping easier to install. Components such as small valve stations and riser manifolds are being manufactured with the option of pre-assembly. There are new specialized sprinkler heads available; more models deal with specific applications.

More jurisdictions are requiring the installation of cross connection control assemblies as part of their by-laws to protect potable water supplies.

Related Components (including, but not limited to)

Pipes: (steel, plastic and copper).

Fittings: elbows, couplings, tees, reducers, adapters, bushings and unions.

Components: sprinkler heads, excess pressure pumps, air compressors, quick opening devices (QODs), retard air chambers, automatic drains, condensate drains, valves, dryers, pressure switches, flow switches, gauges, braces, clips, U-hooks, fire department connections, cross connection controls, strainers, restricted orifice, pre-assembled zone control manifolds and test and drain valves.

Tools and Equipment

Hand tools, power tools, measuring and testing equipment, and PPE and safety equipment.

Task 8

Prepares piping and fittings for installation.

Context

Sprinkler system installers pre-fabricate piping and fittings in order to accelerate the assembly process of the fire protection system. Pre-fabrication can be done at a shop or on-site.

Required Knowledge

- K 1 NFPA standards and national, provincial and municipal regulations
- K 2 tolerances such as groove depth and ring gauge
- K 3 pipe schedules
- K 4 listed pipe, tubing and material
- K 5 specialized tool usage including stainless steel, copper and plastic

K 6	pipe lubricants and sealants, and compatibility with piping and components
K 7	metric and imperial measurements
K 8	types of threads such as National Pipe Thread (NPT), National Fine Thread (NFT), Unified National Fine (UNF) and National Standard Thread (NST)
K 9	bending characteristics
K 10	basic trigonometry

Sub-task

C-8.01 Cuts pipe.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

C-8.01.01	select pipe taking into consideration cutting lengths in order to minimize waste
C-8.01.02	calculate, measure and mark pipe appropriately according to drawings and location
C-8.01.03	select cutter to cut various types of pipes such as steel, copper and plastic
C-8.01.04	select and use tools and equipment such as pipe cutters, hacksaws and hydraulic cutters
C-8.01.05	ream pipe to remove burr and promote hydraulic efficiency
C-8.01.06	verify cut is square to prevent leakage and ensure fit

Sub-task

C-8.02 Bends pipe.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

C-8.02.01	select the application and location for bend
C-8.02.02	interpret NFPA bending standards
C-8.02.03	select pipe schedule and material according to application and NFPA standards

C-8.02.04	select and use bending tools such as chain vices, hydraulic benders and manual benders
C-8.02.05	determine the radius of the bend required with the use of trigonometry

Sub-task

C-8.03 Threads pipe.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

C-8.03.01	adjust die head to achieve proper depth, to allow installation of fittings and to achieve a leak-tight fit
C-8.03.02	select and use tools and equipment such as ratchet dies, oiler and universal dies
C-8.03.03	support pipe by using pipe stands when threading to prevent damage to thread and equipment
C-8.03.04	select and apply cutting oil according to piping material to prevent damage to dies and threads
C-8.03.05	wipe inside and outside of pipe to remove excess cutting oil and shavings

Sub-task

C-8.04 Grooves pipe.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

C-8.04.01	identify grooving methods such as roll grooving and cut grooving
C-8.04.02	identify the pipe material required to be grooved to ensure proper tools are being used
C-8.04.03	set up machine to ensure appropriate groove depth
C-8.04.04	select and use tools and equipment such as hydraulic, cut and portable or in-air groovers
C-8.04.05	measure groove depth required in order to ensure that it will correspond to manufacturers' specifications for the couplings

C-8.04.06	measure the flare to ensure that it is within accepted tolerance to prevent leakage and ensure fit
C-8.04.07	support pipe by using pipe stands when grooving to prevent damage to groove and equipment

Sub-task

C-8.05 Drills pipe.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

C-8.05.01	measure and mark pipe according to drawings
C-8.05.02	select and use tools and equipment such as drills, hole saws and contour markers
C-8.05.03	use contour marker to ensure proper angle and orientation of the outlets
C-8.05.04	drill hole in pipe to corresponding fitting or device hole specifications using hole saw
C-8.05.05	file hole to remove burr
C-8.05.06	recover cut-out disc to prevent blockages of pipes

Sub-task

C-8.06 Grinds pipe.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

C-8.06.01	select and use tools and equipment such as power grinders, files and sand cloth
C-8.06.02	secure pipe when grinding to prevent damage to pipe and equipment using devices such as chain vices, pipe stands and bench vices
C-8.06.03	grind pipe ends to ensure they are square and true
C-8.06.04	bevel pipe at required angle to promote good weld penetration according to NFPA standards

C-8.06.05	grind pipe in a circular motion to ensure a smooth surface
C-8.06.06	inspect pipe to ensure bevel is free of contaminants such as oil, paint and debris

Sub-task

C-8.07 Prepares fittings.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

C-8.07.01	select and use tools and equipment such as wire brushes, sand cloth and files
C-8.07.02	select materials such as solder, brazing rods and flux according to application
C-8.07.03	select fitting size for the application
C-8.07.04	inspect fitting for deficiencies such as cracks, holes and absence of threads
C-8.07.05	grease, sand and flux according to the type of fitting such as copper, plastic and steel to ensure a tight joint

Task 9 Installs pipe and fittings.

Context	Sprinkler system installers connect various types of pipes and fittings (steel, plastic and copper) from a predetermined source to provide a reliable and an adequate supply to fire protection system components according to drawings and NFPA standards.
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Required Knowledge

K 1	NFPA standards and national, provincial and municipal regulations
K 2	hanger and bracket types and characteristics
K 3	pipe and material listings
K 4	types of pipe lubricants and sealants
K 5	metric and imperial measurements
K 6	pipe material
K 7	corresponding labelling requirements for pipe and fittings
K 8	manufacturers' specifications

K 9	hoisting and lifting equipment
K 10	access equipment

Sub-task

C-9.01 Installs steel pipe and fittings.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

C-9.01.01	verify location and spacing of the main and branch lines by referring to drawings and NFPA standards
C-9.01.02	select and use tools and equipment such as pipe wrenches, levels, measuring devices and pliers
C-9.01.03	install pipe in hangers according to NFPA standards
C-9.01.04	join pipes using fittings such as couplings, flanges and threaded fittings
C-9.01.05	orient the fittings to achieve desired position according to application
C-9.01.06	level or grade pipe according to fire protection system requirements and NFPA standards
C-9.01.07	modify pipe layout to site conditions

Sub-task

C-9.02 Installs plastic pipe and fittings.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

C-9.02.01	verify location and spacing of the main and branch lines by referring to drawings and NFPA standards
C-9.02.02	bevel pipe to ensure full penetration of pipe into fitting
C-9.02.03	select and use tools and equipment such as pipe cutters, levels, mitre boxes and measuring devices
C-9.02.04	position pipe in the support or the hanger assembly
C-9.02.05	join pipes using fittings such as couplings, socket fittings and adapter fittings by using solvent cement

C-9.02.06	orient fittings to achieve desired position according to application
C-9.02.07	level pipe according to fire protection system requirements and NFPA standards

Sub-task

C-9.03 Installs copper pipe and fittings.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

C-9.03.01	verify location and spacing of piping such as mains, branch lines and sensing lines by referring to drawings and NFPA standards
C-9.03.02	select and use tools and equipment such as torches, levels and measuring devices
C-9.03.03	select copper pipe according to jurisdictional requirements
C-9.03.04	select support for piping to prevent corrosion caused by dissimilar metal
C-9.03.05	position pipe in the support or the hanger assembly
C-9.03.06	clean pipe ends with sand cloth to remove oxidation and promote capillary action
C-9.03.07	select materials such as solder, brazing rods and flux according to application
C-9.03.08	join pipes using methods such as soldering, brazing and using grooved couplings or compression type fittings
C-9.03.09	orient fittings to achieve desired position
C-9.03.10	level or grade pipe according to fire protection system requirements and NFPA standards
C-9.03.11	install dielectric fittings to prevent electrolysis caused by the joining of dissimilar metals

Sub-task**C-9.04 Paints and labels pipe.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

C-9.04.01	select and use tools and equipment such as paint brushes, paint guns and stencils
C-9.04.02	retouch wrench marks and bare threads with specified paint
C-9.04.03	select paint used for identification and corrosion protection
C-9.04.04	select size and spacing of labelling for pipe identification
C-9.04.05	install hydraulic data plates on pipes to identify data such as residual pressure, density and design area according to NFPA standard

Task 10 Installs piping components.

Context	Sprinkler system installers connect various types of components such as accelerators, air compressors, sprinkler heads, nozzles and valves to the piping system to achieve a complete and efficient fire protection system according to drawings, AHJ and NFPA standards.
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Required Knowledge

K 1	NFPA standards and national, provincial and municipal regulations
K 2	types of fire protection systems
K 3	types of system components such as desiccant air dryers and exhausters
K 4	types of sprinkler heads such as standard, quick-response and dry heads
K 5	components such as sprinkler heads and valves used in environments such as freezing, excessive heat and corrosive
K 6	nozzle types such as foam, CO ₂ and clean agent
K 7	manufacturers' specifications
K 8	listed components
K 9	specialized tools and equipment

K 10	types of cross connection controls such as reduced pressure backflow assembly (RPBA), double check valve assembly (DCVA) and pressure vacuum breaker assembly (PVBA)
K 11	information listed on sprinkler heads such as listings, K-factor, temperature and date of manufacture
K 12	training and certification requirement regarding testing of cross connection control assemblies

Sub-task

C-10.01 Identifies sprinkler heads.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

C-10.01.01	identify sprinkler head temperature according to NFPA standards
C-10.01.02	identify sprinkler heads according to NFPA standards for conditions such as freezing, excessive heat and corrosive
C-10.01.03	identify sprinkler heads according to NFPA standards used in hazard classifications such as residential, quick-response, early suppression fast response (ESFR) and standard response
C-10.01.04	identify sprinkler heads according to NFPA standards used in commodity classifications such as high pile storage, in-rack and solid pile
C-10.01.05	interpret information on sprinkler head listing such as height of deflector, allowable distance from the wall and allowable distance from obstruction
C-10.01.06	differentiate between groups of sprinkler heads such as upright, pendant and sidewall

Sub-task

C-10.02 Installs sprinkler heads and nozzles.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

C-10.02.01	select and use tools and equipment such as head and sprinkler head socket
C-10.02.02	apply thread lubricant/treatment to prevent leakage and ensure fit

C-10.02.03	inspect the sprinkler head and nozzle for deficiencies such as broken bulbs, bent deflectors and bad threads
C-10.02.04	adjust sprinkler head orientation to ensure deflector will establish proper spray pattern
C-10.02.05	adjust sprinkler nozzle orientation to ensure deflector will protect designated area and equipment
C-10.02.06	select temporary protection such as manufacturers' supplied protective caps, aluminium foil and plastic bags to protect the sprinkler heads and nozzles from potential damage until job is completed
C-10.02.07	select and install finishing plates such as concealed, recess and deep cup escutcheons according to head listings
C-10.02.08	select and install permanent head protectors such as head guards, wax coated heads and plastic bags

Sub-task

C-10.03 Installs sleeves.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

C-10.03.01	select sleeve material, diameter and length according to factors such as pipe size, wall and floor thickness, and NFPA standards
C-10.03.02	measure and determine sleeve location prior to the concrete being poured according to drawings
C-10.03.03	attach sleeve to forms using nails or screws when installed prior to concrete pour
C-10.03.04	cut holes for sleeves using tools and equipment such as hammer drills, coring drills, hammers and cold chisels
C-10.03.05	select and apply caulking or sealant according to applications such as fire separation, noise transfer and aesthetics

Sub-task**C-10.04 Installs sway/seismic bracing.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	no	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

C-10.04.01	select location, material, diameter and length of bracing according to factors such as pipe size, location of structural members and NFPA standards
C-10.04.02	calculate NFPA-prescribed angle of the brace or restraint in relation to the pipe and the place of attachment
C-10.04.03	attach swivel and pipe attachments using tools and equipment such as hammer drills and wrenches
C-10.04.04	determine the pipe length between swivel and pipe attachment
C-10.04.05	cut pipe to desired length using tools and equipment such as pipe cutters and hacksaws
C-10.04.06	install pipe between swivel and pipe attachment using tools and equipment such as screwdrivers, and pipe and adjustable wrenches

Sub-task**C-10.05 Installs auxiliary devices.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

C-10.05.01	select and install auxiliary devices according to application, type of system and NFPA standards
C-10.05.02	select and use tools and equipment such as threading machines, pipe wrenches and measuring devices
C-10.05.03	identify and install devices such as main and auxiliary drains, fire department connections and signage according to plans and specifications
C-10.05.04	determine location of system components such as accelerators and fire department connections to ensure they are installed according to plans and specifications
C-10.05.05	adjust set points on components such as air maintenance devices and pressure switches such as low air, low water, alarm, air compressor and excess pressure pump switches according to system requirements

Sub-task**C-10.06 Installs cross connection control assemblies.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	no	yes	yes	yes	yes	NV	NV	NV

Key Competencies

- | | |
|------------|---|
| C-10.06.01 | comply with codes, standards and AHJ requirements |
| C-10.06.02 | select and use tools and equipment such as combination wrenches, pipe wrenches and measuring devices |
| C-10.06.03 | identify and install cross connection controls such as RPBA, DCVA and PVBA according to plans, specifications and municipal regulations |
| C-10.06.04 | install cross connection control assembly using methods such as grooving, flanging and threading |
| C-10.06.05 | test operation of cross connection controls according to AHJ requirements |

BLOCK D

INSTALLATION OF DETECTION, PROTECTION AND CONTROL SYSTEMS

Trends

Wet sprinkler systems that use ESFR technology are increasing in use because they provide more cost efficient fire control and allow the elimination of in-rack sprinkler systems in storage occupancies.

Newly-introduced fire protection systems that use detection devices such as smoke sampling, line detectors and electrical detection are becoming more common.

Related Components (including, but not limited to)

Water-based systems: piping, cross connection controls, valves (check, diaphragm, solenoid, control, alarm), flow and pressure switches, sprinkler heads, hangers, clamps.

Specialty fire protection systems: cylinders, nozzles, releasing panels.

Detection devices: HADs, pilot lines, pressure operated release valves, actuators.

Signal-initiated devices: switches (water flow and pressure alarm), water level indicators, valve tamper switches.

Tools and Equipment

See Appendix A.

Task 11

Installs water-based systems.

Context

Sprinkler system installers install water-based systems in commercial, industrial and residential buildings. These systems contain water as an integral part of the suppression agent. They primarily remove heat from the fire triangle to suppress the fire.

Required Knowledge

- K 1 spacing requirements of sprinkler heads and hangers
- K 2 design criteria for water-based systems such as density, square footage and hazard classifications
- K 3 types of wet systems such as ESFR, large drop and in-rack
- K 4 wet sprinkler system components such as riser manifolds, alarm check valves and flow switches

K 5	drainage requirements for each water-based system
K 6	operating principles for various water-based systems
K 7	hanger requirements for water-based systems
K 8	antifreeze systems such as configuration, types of solutions and temperature mixtures
K 9	actuation methods such as wet pilot line, dry pilot line and electrical actuation
K 10	applications and types of preaction/deluge systems such as computer rooms, freezers, aircraft hangers and electrical rooms
K 11	activation devices for systems such as preaction and deluge systems
K 12	requirements for location of valves such as accessibility, and heated and lighted space
K 13	applications for foam systems such as aircraft hangers and fuel storage tanks
K 14	actuation methods for foam systems
K 15	types/classes of standpipe systems such as wet pipe, dry pipe and combination
K 16	types of piping used in water mist systems such as stainless steel
K 17	mathematic calculations for determining piping volume and pressure calculations

Sub-task

D-11.01 Installs wet systems.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

D-11.01.01	determine location of mains and branch lines to avoid obstructions
D-11.01.02	determine location of components such as valves and flow switches to ensure accessibility for servicing and testing
D-11.01.03	determine location of auxiliary drains and requirements for valves according to volume of trapped water
D-11.01.04	fabricate piping such as risers and starter pieces on site to allow for site conditions
D-11.01.05	install return bends on wet systems according to NFPA standards to prevent plugging of sprinkler heads when drawing from raw water sources

D-11.01.06	connect piping to water supply using methods such as flanged, soldered and threaded joints
D-11.01.07	install auxiliary devices such as water motor gongs, excess pressure pumps and signalling devices
D-11.01.08	install alarm valve trim such as alarm test valves, main drains and supply pressure gauges
D-11.01.09	pressure test wet system according to test parameters

Sub-task

D-11.02 Installs dry systems.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

D-11.02.01	determine location of mains and branch piping to minimize trapped water
D-11.02.02	determine location of auxiliary drains and requirements for valves according to volume of trapped water and condensation problems
D-11.02.03	install hangers and supports to grade pipe according to code requirements to ensure adequate drainage
D-11.02.04	identify devices such as dry pendant sprinkler heads, flush seal gaskets and dryers according to temperature considerations
D-11.02.05	install return bends on dry systems according to NFPA standards to prevent plugging of sprinkler heads by sediment
D-11.02.06	install dry pipe valves and associated trim such as low air pressure switches and QODs
D-11.02.07	determine where fire department connection (FDC) attaches to dry pipe system
D-11.02.08	determine limitations of dry systems according to NFPA standards such as size and response time
D-11.02.09	perform calculations on the required fill-time of compressed air in shops requiring the installation of various types of air compressors

Sub-task**D-11.03 Installs antifreeze systems.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

- | | |
|------------|--|
| D-11.03.01 | determine limitations of antifreeze systems according to NFPA standards such as volume and number of sprinkler heads |
| D-11.03.02 | install hangers and supports to grade pipe according to code requirements to ensure adequate drainage |
| D-11.03.03 | install control and test valves to allow for accessibility for servicing, testing and replenishing of antifreeze |
| D-11.03.04 | install drainage piping according to environmental protection practices and AHJ |
| D-11.03.05 | determine antifreeze strength required according to temperature of protected spaces by using refractometers |
| D-11.03.06 | vent air from system at high point when filling system with antifreeze to prevent dilution of antifreeze by water |
| D-11.03.07 | perform pressure tests such as hydrostatic and pneumatic testing according to test parameters |
| D-11.03.08 | install components such as expansion tanks, RPBA and check valves to protect systems' integrity |

Sub-task**D-11.04 Installs preaction/deluge systems.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

- | | |
|------------|--|
| D-11.04.01 | determine location of piping and valves to allow for accessibility for service |
| D-11.04.02 | install hangers and supports to grade pipe according to code requirements to ensure adequate drainage |
| D-11.04.03 | install preaction valves and trim such as solenoid actuators and diaphragm actuators |
| D-11.04.04 | install return bends on preaction systems according to NFPA standards to prevent plugging of sprinkler heads by sediment |

D-11.04.05	perform functional tests to verify operation of components and meet intended design criteria such as interlock, double interlock and cross zoning
D-11.04.06	perform tests such as trip and flow according to test parameters

Sub-task

D-11.05 Installs foam systems.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

D-11.05.01	determine location of piping and valves to allow for accessibility for service
D-11.05.02	install piping and valves according to engineered specifications
D-11.05.03	install foam tanks in close proximity to valves and to allow accessibility for refilling
D-11.05.04	install valves and trim such as solenoid actuators, proportioners and diaphragm actuators
D-11.05.05	install distribution devices such as sprinkler heads and generators
D-11.05.06	perform functional testing to ensure proper concentration of foam
D-11.05.07	fill foam tanks according to manufacturers' specifications using equipment such as positive displacement pumps and syphons

Sub-task

D-11.06 Installs standpipe systems.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

D-11.06.01	determine location of piping and valves to allow for accessibility for service
D-11.06.02	determine distance between hose-valve stations according to drawings, AHJ and NFPA standards
D-11.06.03	install fire hose valves at required locations
D-11.06.04	install pressure reducing devices to limit pressure to ensure manageable hose use at all levels

D-11.06.05	install stand-alone standpipe and combination standpipe systems by using common risers
D-11.06.06	install temporary standpipe systems to ensure fire protection during construction

Sub-task

D-11.07 Installs water mist systems.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

D-11.07.01	determine location of piping and valves according to manufacturers' specifications and to allow for accessibility for service
D-11.07.02	install supports and brackets to support piping that surrounds the structure and equipment being protected
D-11.07.03	install components such as positive displacement pumps, relief valves, detection devices and nozzles
D-11.07.04	flush system to prevent plugging of nozzles

Task 12 Installs specialty fire suppression systems.

Context	Specialty fire suppression systems are designed to extinguish a fire rather than control it. They have a finite supply of extinguishing agent and must be refilled after activation. These systems require some degree of specialization and unique skill sets amongst sprinkler system installers.
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Required Knowledge

K 1	types of pipe used for specialty fire suppression systems
K 2	clean agent system mediums and their properties
K 3	containment requirements for clean agent systems
K 4	limited extinguishing ability of clean agent and carbon dioxide systems
K 5	applications of clean agent and carbon dioxide systems such as server rooms, archival storage and libraries

K 6	types and sizes of portable extinguishers such as dry chemical, carbon dioxide and water-based
K 7	installation methods for fire extinguishers such as cabinet and wall-mount
K 8	extinguishing properties of dry chemical, clean agent and carbon dioxide systems
K 9	physical hazards associated with specialty fire suppression systems such as handling of materials and cylinders, and accidental discharge

Sub-task

D-12.01 Installs dry chemical, clean agent and carbon dioxide systems.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

D-12.01.01	select pipe and fittings to match manufacturers' specifications such as extra heavy fittings, pipe size and seamless pipe
D-12.01.02	select and use tools and equipment
D-12.01.03	remove possible obstructions in pipe by reaming, cleaning and blow out
D-12.01.04	modify system piping only after consultation with engineer or designer
D-12.01.05	install clamps to prevent pipe movement during discharge of extinguishing agent
D-12.01.06	install piping and nozzles according to drawings and specifications to ensure equal discharge
D-12.01.07	install and secure storage cylinders to ensure safety due to high pressure of cylinders
D-12.01.08	install activation devices according to manufacturers' specifications
D-12.01.09	assist in verification of controls and actuators

Sub-task**D-12.02 Installs portable extinguishers.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

- | | |
|------------|---|
| D-12.02.01 | determine type and location of extinguishers according to drawings, specifications and local codes |
| D-12.02.02 | install extinguisher and/or cabinets according to drawings |
| D-12.02.03 | confirm that extinguishers are fully charged with pins and seals in place along with a currently dated inspection tag which is stamped by qualified personnel |

Task 13 Installs detection devices.

Context These devices detect a fire situation and initiate a response of the fire protection system.

 The installation of electrical detection systems is performed by sprinkler system installers in some jurisdictions while in most it is not within the scope of the trade.

Required Knowledge

- | | |
|-----|---|
| K 1 | components of pilot lines such as heads, fixed temperature release and pilot line detectors |
| K 2 | parameters of pilot lines such as spacing of sprinkler heads, sizing and installation methods |
| K 3 | parameters of HADs such as spacing, temperature and type |
| K 4 | components of spark detection systems such as solenoids and spark detectors |
| K 5 | parameters of spark detection systems such as spacing and location |
| K 6 | components of smoke sampling systems such as sampling panels and tubings |
| K 7 | parameters of smoke sampling systems |

K 8	components of electrical detection systems
K 9	parameters of electrical detection systems

Sub-task

D-13.01 Installs wet and dry pilot lines.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	no	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

D-13.01.01	identify pilot heads according to temperature requirements for wet and dry pilot lines
D-13.01.02	select and use tools and equipment
D-13.01.03	install pilot lines according to parameters such as proximity to sprinkler heads on fire protection piping, heat collection and ceiling structure
D-13.01.04	space pilot line sprinkler heads according to NFPA standards
D-13.01.05	connect pilot lines to valve trim
D-13.01.06	perform pressure test for pilot lines according to NFPA standards

Sub-task

D-13.02 Installs heat-actuated detectors (HADs).

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	no	no	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

D-13.02.01	determine location of HADs according to manufacturers' specifications and AHJ
D-13.02.02	select and use tools and equipment
D-13.02.03	mount releasing panel as necessary in proximity to releasing devices to facilitate actuation of system
D-13.02.04	install piping, tubing and wire in area being protected according to manufacturers' specifications, AHJ and NFPA standards
D-13.02.05	attach linear heat detection wire according to manufacturers' specifications
D-13.02.06	test HADs using heat lamps or hot water

Sub-task**D-13.03 Installs spark detection systems.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
no	yes	no	no	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

- D-13.03.01 determine location of system according to manufacturers' specifications
- D-13.03.02 select and use tools and equipment
- D-13.03.03 fasten devices such as detectors, nozzles and solenoids to structure to ensure detection of sparks and flame
- D-13.03.04 assemble required system components such as solenoids and nozzles
- D-13.03.05 install piping to spark detection system
- D-13.03.06 assist in commissioning and aiming of spark detection devices

Sub-task**D-13.04 Installs air sampling systems.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
no	yes	no	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

- D-13.04.01 determine location of system according to drawings and manufacturers' specifications
- D-13.04.02 select and use tools and equipment
- D-13.04.03 connect components of smoke sampling system according to manufacturers' specifications
- D-13.04.04 install smoke sampling pipe to draw smoke into the air sampling detector to detect smoke concentrations
- D-13.04.05 connect and terminate smoke sampling system to activation panel

Sub-task**D-13.05 Installs electrical detection systems.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
no	yes	no	no	yes	no	no	no	yes	no	NV	NV	NV

Key Competencies

D-13.05.01	select and use tools and equipment
D-13.05.02	install the smoke and heat detectors that are an integral part of the fire protection system
D-13.05.03	install electrical boxes for alarm bell and strobes
D-13.05.04	run conduit pipe by bending and attaching to building structure
D-13.05.05	pull wire through conduit
D-13.05.06	connect wiring from smoke detectors to releasing panel
D-13.05.07	verify operation of smoke and heat detectors by using heat guns and synthetic smoke

Task 14**Installs signal-initiating devices.**

Context	Alarm-initiating devices provide electrical signals to the local alarms which warn of the activation of the fire protection system. Supervisory-initiating devices provide notification of trouble or impairment of the fire protection system.
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Required Knowledge

K 1	installation locations for alarm-initiating devices
K 2	operation and applications of alarm-initiating devices
K 3	types of alarm-initiating devices such as paddle-type flow switches and pressure switches
K 4	types of supervisory-initiating devices such as low air pressure, low water pressure and tamper
K 5	operation and applications of supervisory-initiating devices
K 6	types and limitations of pressure switches
K 7	installation procedures for tamper switches
K 8	test procedures

Sub-task**D-14.01 Installs alarm-initiating devices.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

D-14.01.01	select and use tools and equipment
D-14.01.02	install device according to pipe size, system type and location
D-14.01.03	determine location of alarm-initiating devices according to drawings and NFPA standards
D-14.01.04	place devices to allow for replacement and repair
D-14.01.05	attach devices to piping by methods such as threaded connections and clamps
D-14.01.06	install a means of testing such as a test and drain valve or an alarm test valve
D-14.01.07	field test and adjust devices that assist in verification of operation of devices
D-14.01.08	perform test on devices to confirm operation

Sub-task**D-14.02 Installs supervisory-initiating devices.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

D-14.02.01	select device according to pipe size, system type and location
D-14.02.02	determine location of supervisory-initiating devices according to manufacturers' specifications and drawings
D-14.02.03	select and use tools and equipment
D-14.02.04	attach devices to piping and components by methods such as threaded connections and clamps
D-14.02.05	field test and adjust devices that assist in verification of operation of devices

BLOCK E

SERVICE OF FIRE PROTECTION SYSTEMS

Trends	Due to NFPA standards and AHJ requirements, there is an increased demand in scheduled maintenance to ensure proper operation of fire protection systems. With advances in technology, devices are increasingly complex, and require more frequent and periodic maintenance, inspection and testing.
Related Components	All components apply.
Tools and Equipment	See Appendix A.

Task 15

Maintains and repairs fire protection systems.

Context	Sprinkler system installers perform maintenance and repairs on all types of fire protection systems to prevent malfunctions or failures.
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Required Knowledge

K 1	water-based systems and their operation
K 2	specialty fire suppression systems and their operation
K 3	detection devices and their operation
K 4	pipng and components and their operation
K 5	pumps and components and their operation
K 6	water supplies and their operation
K 7	signal initiating devices and their operation
K 8	common problems particular to systems
K 9	troubleshooting techniques
K 10	maintenance requirements for fire protection systems

K 11	facilities operating procedures
K 12	testing procedures

Sub-task

E-15.01 Troubleshoots fire protection systems.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

E-15.01.01	identify problem by examining fire alarm panel and speaking with owner's representative, determining location and nature of the problem
E-15.01.02	analyse symptoms of malfunction in problem area to determine probable cause
E-15.01.03	determine required corrective action to reinstate system's integrity
E-15.01.04	inform owner of required action and obtain permission prior to initiating repair
E-15.01.05	select and use tools and equipment such as voltmeters, flashlights and air monitoring devices

Sub-task

E-15.02 Repairs deficiencies.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

E-15.02.01	notify appropriate authorities such as owner's representative, local fire department and monitoring stations to prevent false fire service responses
E-15.02.02	disable and disarm system within determined parameters to allow for repairs
E-15.02.03	select and use tools and equipment such as wrenches, measuring devices and compressors
E-15.02.04	repair or replace deficient components such as pipe and fittings, sprinkler heads and valves based on nature of problem
E-15.02.05	take corrective actions such as adjusting devices, filling and recharging systems and resetting fire alarm systems to return system to normal operational status

- E-15.02.06 verify repair using appropriate testing procedures such as tripping of dry valves, initiating devices, and hydrostatic and pneumatic tests
- E-15.02.07 notify appropriate authorities such as owner's representative, local fire department and monitoring stations upon completion of work
- E-15.02.08 inform owner's representative upon completion of repair, and have all applicable documentation completed

Sub-task

E-15.03 Performs scheduled maintenance.

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

- E-15.03.01 notify appropriate authorities such as owner's representative, local fire department and monitoring stations to prevent false fire service responses
- E-15.03.02 disable and disarm system within determined parameters to allow for maintenance
- E-15.03.03 select and use tools and equipment such as screwdrivers, wrenches and flashlights
- E-15.03.04 keep equipment operational by performing actions such as checking for blockage or frost plugs, changing desiccant in air dryers, cleaning strainers, investigating obstructions and draining low points on dry systems
- E-15.03.05 inform owner's representative of any additional problems that were found requiring corrective action
- E-15.03.06 notify appropriate authorities such as owner's representative, local fire department and monitoring stations upon completion of work
- E-15.03.07 inform owner's representative upon completion of maintenance, and have all applicable documentation completed

Task 16**Inspects and tests fire protection systems.**

Context Frequent inspection and testing of fire protection systems is vital to ensure that these systems work within their required parameters. This is essential in the preservation of life and property.

Required Knowledge

K 1	fire protection systems and their operation
K 2	frequency of testing and inspection required for fire protection systems
K 3	types of fire extinguishers
K 4	testing and inspection procedures and standards
K 5	facilities operating procedures and system requirements
K 6	components of fire protection systems such as valves, nozzles and fire hoses
K 7	fire hydrant operation and drainage

Sub-task**E-16.01 Performs scheduled inspections.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

E-16.01.01	notify appropriate authorities such as owner's representative of scheduled inspection
E-16.01.02	select and use documents required for inspections such as checklists
E-16.01.03	select and use tools and equipment such as measuring devices, lights and laser levels
E-16.01.04	perform visual inspections and refer to previous reports to detect abnormalities and deficiencies such as painted sprinkler head, corroded materials and closed valves of the fire protection systems
E-16.01.05	inform owner's representative upon completion of tests and of deficiencies that have been identified during the inspection procedures, and have all applicable documentation completed

Sub-task**E-16.02 Performs scheduled tests.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	NV	NV	NV

Key Competencies

E-16.02.01	notify appropriate authorities such as owner's representative, local fire department and monitoring stations of scheduled test
E-16.02.02	select and use tools and equipment such as pitot gauges, refractometers and tachometers
E-16.02.03	disable and disarm system within determined parameters to allow for testing
E-16.02.04	perform required tests on fire protection system components to ensure that they work within established parameters
E-16.02.05	notify appropriate authorities such as local fire department and monitoring stations upon completion of work
E-16.02.06	inform owner's representative upon completion of tests, and of deficiencies that have been identified during testing procedures, and have all applicable documentation completed

Sub-task**E-16.03 Inspects portable fire extinguishers.**

<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>
yes	yes	no	yes	yes	yes	no	yes	no	yes	NV	NV	NV

Key Competencies

E-16.03.01	perform visual inspection of pins and seals to ensure that they are in place and secured
E-16.03.02	verify that hoses and nozzles are intact and clear of obstructions
E-16.03.03	verify gauge pressure and cylinder weight to ensure it is within acceptable operating parameters
E-16.03.04	ensure type and location of fire extinguishers match the hazards of the area
E-16.03.05	select and use tools and equipment such as pipe wrenches and files
E-16.03.06	determine frequency of re-fill and hydrostatic testing of cylinders



APPENDICES

APPENDIX A

TOOLS AND EQUIPMENT

Hand Tools

adjustable wrenches (various sizes)	hose wrench
Allen wrenches (metric and imperial)	line-up bars
bench vice	locking pliers
brushes (various bristle brushes for caulking gun, chain vice, pipe vice, cleaning and scrubbing)	nipple chuck
centre finder	oil can
centre punch	paint brushes
cold chisels (various sizes)	pick
combination wrenches (metric and imperial)	pipe wrench
contour marker	pliers (needle nose, slip joint)
crimping tools	plumb bob
die and chasers	pry bar
differential gauge test kit	rod cutters
digital camera	rod dies
drywall saw	scissors
electric cord	scrapers (various sizes)
files (flat, half-round, rat-tail, bastard)	screwdrivers (flat, Phillips, Robertson, various sizes)
flaring tool	snips (heavy duty sheet metal cutting)
flashlight	socket sets (metric and imperial)
gasket cutter	strap wrench
grease gun	tripod vice
hacksaw	trowels (concrete and pointer)
hammers (ball-peen, claw, sledge)	utility knives
hand saw	wire brush
head wrench	wire cutter

Portable Power Tools

air monitoring device	flushing machine
cellular phone	grinders (wire brush, angle grinders)
chop saw	hammer drill
compressor	hand-held electronic tape
computer	hand-held and stationary radios
concrete cutting machine	heating torch
core driller	hydraulic bender
die equipment	impact wrenches (electric, pneumatic and wireless)
drills (portable magnetic base, drill press, cordless)	jig saw
electric drills	knife groover
electronic measuring device	mechanical pipe-joining equipment

Portable Power Tools (continued)

oxyacetylene brazing torch	tamper
oxyacetylene cutting torch	tapping machine and attachments
pipe cutter	testing pump
powervise	threading machine
reamer (hand-held or mounted on power threader)	vacuum cleaner (wet/dry)
reciprocating saw	water pump
roll groover	wire wheel (body grinder or angle grinder with wire brush)
scanner location device	

Measuring and testing Equipment

adapter fittings	manometer
amp/volt meter	Pitot tubes
back flow test kit	play pipes
battery load tester	pressure gauge kit
builder's level	refractometer
calculator	sight tube
calibrating gauge	spirit level
calipers	square
depth gauge	stop watch
dial indicator	straightedge
differential pressure gauge	tachometer
drafting equipment	tape measure
feeler gauge	temperature gauge
flow meter	test hoses and securement
heat lamp	testing pump, excess, protomatic test pump
hoses	thread depth gauge
hydrometer	torque wrench
laser level	transit
liquid measuring containers	vernier calliper
magnetic level	

Hoisting, Lifting, and Access Equipment

cable clamps	overhead hoist
chain block hoist	pipe buggy (pipe cannon)
chains	pipe dolly (grasshopper)
choker	pipe stand
come-alongs (cable or chain)	portable boom
fork-lift	power-elevated work platform
jack	rope
ladder	scaffolding (safety)
man lift	shackles

Hoisting, Lifting, and Access Equipment (continued)

sling	support
spreader bar	tugger
stand	

Personal Protective Equipment and Safety Equipment

air hood	fire-retardant clothing
air monitoring device	gloves
apron	goggles
boots	hard hat
confined space entry equipment	knee pads
coveralls	mask (particle, vapour)
earplugs and earmuffs	reflector vest
face shield	respirator
fall arrest system	safety glasses
filtration mask	self-contained breathing apparatus (SCBA)
fire blanket	tag- and lock-out devices
fire extinguisher	travel restraint system
fire hoses	welding partition

APPENDIX B

GLOSSARY

accelerators	quick opening device that speeds up the trip action of a dry pipe valve
air dryer	any one of several types of air dryers, such as refrigerated air dryers and desiccant air dryers
backfill	earth, soil or gravel (aggregate) used in proper placement to bury underground piping
cathodic protection	a method of grounding used primarily on steel water tanks and underground piping to prevent electrolysis
choker	a type of cable with loops on both ends that is used for rigging and lifting materials and equipment
cross connection control	assemblies that prevent potentially contaminated water from flowing back into the water supply
deluge system	a dry pipe system with open sprinkler heads, set up so that when the system is tripped all heads spray simultaneously
dies	equipment used to cut external threads in rod or pipe
dry pipe system	a sprinkler system charged with air, primarily used to prevent freezing in a cold environment
escutcheon	see "plates"
exhausters	automatic device that expels air from the system
flow switch	a device that monitors water flow and initiates an alarm signal to a fire alarm panel or equivalent
flushing connection	a connection used to flush water from piping and components; for example, at the end of a water main or hydrant
grade	the slope of a pipe or trench, usually expressed as a ratio of rise (change in elevation) to run (change in distance)
grooving (of pipe)	a process of mechanically joining pipe in which a groove is cut or pressed (rolled) around a pipe to accommodate a coupling
hangers	components installed to allow pipes to be attached to overhead or other support structures

head guards	devices used to protect heads from damage
heat-actuated detector (HAD)	heat-activated device, triggered when a specified temperature or rate of increasing temperature is detected
laydown	a predetermined area where material is stored
packing	material placed around water- or oil-tight shafts to prevent leakage
plates	aesthetic or cosmetic plates through which sprinkler heads enter the building space (sometimes called escutcheon plates)
play pipe	flow test pipe attached to the end of a fire hose
pump room	also called pump house. A designated area or room in a building or outside a building that contains a fire pump and its components
reaming	a process to restore the pipe to its original inside diameter, usually by removing the internal burr or flare formed when the pipe was cut
retard air chamber	a piece of equipment that is used to prevent false alarms from water surges when attached to an alarm check valve
sleeve	mechanical block-out installed before or after concrete or other structural placement to enable pipes to pass from one area of a structure to another
sling	any metal or synthetic flexible device used to cradle or support a load. Slings are attached to the hoist line of the lifting device to complete the lift
standpipe system	a system to which fire fighting hoses are attached, usually in high-rise buildings
tamper switch	device which monitors the opening or closing of a valve by sounding trouble signal in fire alarm panel. Two examples are PIVs, outside stem yoke
thrust block	concrete restraint cast in place at critical point in underground piping installations, in order to prevent hydraulic pressure from moving or separating pipe joints
trim	smaller or auxiliary piping attached to installed devices such as valves and pumps. Often supplied as a "trim package"

valves

device placed in a pressurized piping system in order to control, direct or prevent the movement of chemicals, gases, liquids or other substances (examples include: swing, check, wafer check, vertical lift, ball check, ball drip, relief, solenoid, pneumatic, shut-off)

water motor gong

a water-operated local alarm that operates on a water flow situation and only for the duration of the water flow

**wet system/wet pipe
system/sprinkler
system**

sprinkler system triggered by heat from a fire in which water discharges immediately from sprinklers. The automatic sprinklers are attached to a piping system containing water and connected to a water supply

APPENDIX C

ACRONYMS

AHJ	authority having jurisdiction
CPVC	chlorinated poly vinyl chloride
CS	coach screw
DCVA	double check valve assembly
ESFR	early suppression fast response
FDC	fire department connection
GFCI	ground fault interrupter
HAD	heat-actuated detector
MSDS	Material Safety Data Sheets
NFPA	National Fire Protection Association
NFT	national fine thread
NPT	national pipe thread
NST	national standard thread
OH&S	Occupational Health and Safety
OS&Y	operating stem & yoke
PIV	post indicator valve
PPE	personal protective equipment
PVBA	pressure vacuum breaker assembly
QOD	quick operating device
RPBA	reduced pressure backflow
TDG	transportation of dangerous goods
UNF	Unified National Fine
WHMIS	Workplace Hazardous Materials Information System

APPENDIX D**BLOCK AND TASK WEIGHTING****BLOCK A COMMON OCCUPATIONAL SKILLS**

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	National Average
%	10	30	25	14	15	9	20	17	30	10	NV	NV	NV	18%

Task 1 Uses and maintains tools and equipment.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	20	20	10	22	10	18	15	26	20	10	NV	NV	NV	17%

Task 2 Organizes work.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	20	30	10	15	30	20	40	22	30	30	NV	NV	NV	25%

Task 3 Performs common trade activities.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	40	30	65	38	30	28	25	32	30	50	NV	NV	NV	37%

Task 4 Commissions systems.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	20	20	15	25	30	34	20	20	20	10	NV	NV	NV	21%

BLOCK B WATER SUPPLY INSTALLATION

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	National Average
%	15	5	15	22	20	16	10	6	5	15	NV	NV	NV	13%

Task 5 Installs underground water supplies.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	20	20	15	35	30	25	5	11	0	30	NV	NV	NV	19%

Task 6 Installs fire and booster pumps.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	60	60	70	42	40	25	80	54	65	60	NV	NV	NV	56%

Task 7 Installs private water supply systems.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	20	20	15	23	30	50	15	35	35	10	NV	NV	NV	25%

BLOCK C PIPING INSTALLATION

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	National Average
%	30	30	30	25	25	20	25	38	35	35	NV	NV	NV	29%

Task 8 Prepares piping and fittings for installation.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	20	34	10	26	30	30	15	20	25	33	NV	NV	NV	24%

Task 9 Installs pipe and fittings.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	40	33	70	41	35	35	30	41	45	33	NV	NV	NV	40%

Task 10 Installs piping components.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	
%	40	33	20	33	35	35	55	39	30	34	NV	NV	NV	36%

BLOCK D INSTALLATION OF DETECTION, PROTECTION AND CONTROL SYSTEMS

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	National Average
%	30	20	15	18	25	40	25	28	15	30	NV	NV	NV	25%

Task 11 Installs water-based systems.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	48%
%	40	40	65	40	40	45	65	38	50	60	NV	NV	NV	

Task 12 Installs specialty fire suppression systems.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	22%
%	20	30	20	24	20	20	15	25	20	20	NV	NV	NV	

Task 13 Installs detection devices.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	13%
%	20	10	0	16	20	20	10	15	10	10	NV	NV	NV	

Task 14 Installs signal-initiating devices.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	17%
%	20	20	15	20	20	15	10	22	20	10	NV	NV	NV	

BLOCK E SERVICE OF FIRE PROTECTION SYSTEMS

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	National Average
%	15	15	15	21	15	15	20	11	15	10	NV	NV	NV	15%

Task 15 Maintains and repairs fire protection systems.

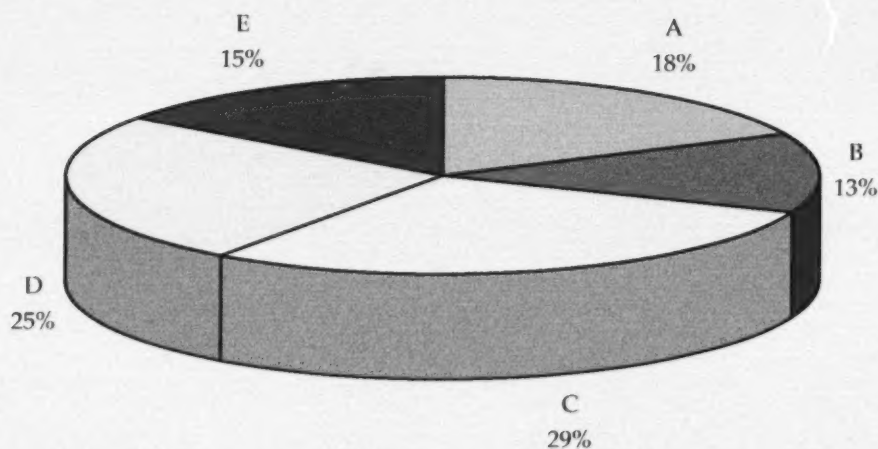
	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	50%
%	50	50	50	50	50	50	40	50	50	60	NV	NV	NV	

Task 16 Inspects and tests fire protection systems.

	<u>NL</u>	<u>NS</u>	<u>PE</u>	<u>NB</u>	<u>QC</u>	<u>ON</u>	<u>MB</u>	<u>SK</u>	<u>AB</u>	<u>BC</u>	<u>NT</u>	<u>YT</u>	<u>NU</u>	50%
%	50	50	50	50	50	50	60	50	50	40	NV	NV	NV	

APPENDIX E

PIE CHART*



TITLES OF BLOCKS

BLOCK A	Common Occupational Skills	BLOCK D	Installation of Detection, Protection and Control Systems
BLOCK B	Water Supply Installation	BLOCK E	Service of Fire Protection Systems
BLOCK C	Piping Installation		

*Average percentage of the total number of questions on an interprovincial examination, assigned to assess each block of the analysis, as derived from the collective input from workers within the occupation from all areas of Canada. Interprovincial examinations typically have from 100 to 150 multiple-choice questions.

APPENDIX F

TASK PROFILE CHART – SPRINKLER SYSTEM INSTALLER

BLOCKS	TASKS	SUB-TASKS				
A - COMMON OCCUPATIONAL SKILLS	1. Uses and maintains tools and equipment.	1.01 Maintains hand tools.	1.02 Maintains portable and stationary power tools.	1.03 Maintains measuring and testing equipment.	1.04 Uses access equipment.	1.05 Uses rigging, hoisting and lifting equipment.
		1.06 Uses personal protective equipment (PPE) and safety equipment.				
	2. Organizes work.	2.01 Interprets codes, regulations and procedures.	2.02 Interprets blueprints and specifications.	2.03 Uses documentation and reference material.	2.04 Communicates with others.	2.05 Plans daily job tasks and procedures.
		2.06 Maintains safe work environment.				
	3. Performs common trade activities.	3.01 Prepares work site.	3.02 Handles materials and supplies.	3.03 Installs supports and hangers.	3.04 Performs layout of systems.	
	4. Commissions systems.	4.01 Commissions water supply systems.	4.02 Commissions piping installation.	4.03 Commissions detection, protection and control systems.		
B - WATER SUPPLY INSTALLATION	5. Installs underground water supplies.	5.01 Supervises trenching and backfilling.	5.02 Installs underground piping and components.	5.03 Flushes underground system.		

BLOCKS	TASKS	SUB-TASKS				
C - PIPING INSTALLATION	6. Installs fire and booster pumps.	6.01 Determines location of pumps, drivers, controllers and components.	6.02 Installs pumps, controllers and components.			
	7. Installs private water supply systems.	7.01 Installs water tanks.	7.02 Installs related equipment.			
	8. Prepares piping and fittings for installation.	8.01 Cuts pipe.	8.02 Bends pipe.	8.03 Threads pipe.	8.04 Grooves pipe.	8.05 Drills pipe.
		8.06 Grinds pipe.	8.07 Prepares fittings.			
	9. Installs pipe and fittings.	9.01 Installs steel pipe and fittings.	9.02 Installs plastic pipe and fittings.	9.03 Installs copper pipe and fittings.	9.04 Paints and labels pipe.	
	10. Installs piping components.	10.01. Identifies sprinkler heads.	10.02. Installs sprinkler heads and nozzles.	10.03 Installs sleeves.	10.04. Installs sway/seismic bracing.	10.05 Installs auxiliary devices.
		10.06 Installs cross connection control assemblies.				
	11. Installs water-based systems.	11.01 Installs wet systems.	11.02 Installs dry systems.	11.03 Installs antifreeze systems.	11.04 Installs preaction/deluge systems.	11.05 Installs foam systems.
D - INSTALLATION OF DETECTION, PROTECTION AND CONTROL SYSTEMS						

BLOCKS	TASKS	SUB-TASKS				
E - SERVICE OF FIRE PROTECTION SYSTEMS		11.06 Installs standpipe systems.	11.07 Installs water mist systems.			
	12. Installs specialty fire suppression systems.	12.01 Installs dry chemical, clean agent and carbon dioxide systems.	12.02 Installs portable extinguishers.			
	13. Installs detection devices.	13.01 Installs wet and dry pilot lines.	13.02 Installs heat-actuated detectors (HADs).	13.03 Installs spark detection systems.	13.04 Installs air sampling systems.	13.05 Installs electrical detection systems.
	14. Installs signal-initiating devices.	14.01 Installs alarm-initiating devices.	14.02 Installs supervisory-initiating devices.			
	15. Maintains and repairs fire protection systems.	15.01 Troubleshoots fire protection systems.	15.02 Repairs deficiencies.	15.03 Performs scheduled maintenance.		
	16. Inspects and tests fire protection systems.	16.01 Performs scheduled inspections.	16.02 Performs scheduled tests.	16.03 Inspects portable fire extinguishers.		